

1 WHAT IS CLAIMED IS:

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1. A microphone array apparatus comprising:
a microphone array including microphones,
one of the microphones being a reference microphone;
filters receiving output signals of the
10 microphones; and
a filter coefficient calculator which
receives the output signals of the microphones, a
noise and a residual signal obtained by subtracting
filtered output signals of the microphones other than
15 the reference microphone from a filtered output signal
of the reference microphone and which obtain filter
coefficients of the filters in accordance with an
evaluation function based on the residual signal.

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2. The microphone array apparatus as
claimed in claim 1, further comprising:
25 delay units provided in front of the
filters; and
a delay calculator which calculates amounts
of delays of the delay units on the basis of a maximum
value of a crosscorrelation function of the output
30 signals of the microphones and the noise.

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3. The microphone array apparatus as
claimed in claim 1, wherein the noise is a signal
which drives a speaker.

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1 4. The microphone array apparatus as
 claimed in claim 1, further comprising a supplementary
 microphone which outputs the noise.

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 5. The microphone array apparatus as
 claimed in claim 1, wherein the filter coefficient
10 calculator includes a cyclic type low-pass filter
 which applies a comparatively small weight to memory
 values of a filter portion which executes a
 convolutional operation in an updating process of the
 filter coefficients.

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 6. A microphone array apparatus comprising:
20 a microphone array including microphones;
 linear predictive filters receiving output
 signals of the microphones;

 linear predictive analysis units which
 receives the output signals of the microphones and
25 update filter coefficients of the linear predictive
 filters in accordance with a linear predictive
 analysis; and

 a sound source position detector which
 obtains a crosscorrelation coefficient value based on
30 linear predictive residuals of the linear predictive
 filters and outputs information concerning the
 position of a sound source based on a value which
 maximizes the crosscorrelation coefficient value.

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1 7. The microphone array apparatus as
 claimed in claim 6, wherein:
 a target sound source is a speaker; and
 the linear predictive analysis unit updates
5 the filter coefficients of the linear predictive
 filters by using a signal which drives the speaker.

10 8. A microphone array apparatus comprising:
 a microphone array including microphones;
 a signal estimator which estimates positions
 of estimated microphones in accordance with intervals
15 at which the microphones are arranged by using the
 output signals of the microphones and a velocity of
 sound and which outputs output signals of the
 estimated microphones together with the output signals
 of the microphones forming the microphone array; and
20 a synchronous adder which pulls phases of
 the output signals of the microphones and the
 estimated microphones and then adds the output
 signals.

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 9. The microphone array apparatus as
 claimed in claim 8, further comprising a reference
30 microphone located on an imaginary line connecting the
 microphones forming the microphone array and arranged
 at intervals at which the microphones forming the
 microphone array are arranged,
 wherein the signal estimator which corrects
35 the estimated positions of the estimated microphones
 and the output signals thereof on the basis of the
 output signals of the microphones forming the

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1 12. A microphone array apparatus
comprising:
 a microphone array including microphones;
 a sound source position detector which
5 detects a position of a sound source on the basis of
output signals of the microphones;
 a camera generating an image of the sound
source;
 a second detector which detects the position
10 of the sound source on the basis of the image from the
camera; and
 an integrate decision processing unit which
outputs information indicating the position of the
sound source on the basis of the information from the
15 sound source position detector and the information
from the second detector.

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